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AGREEMENT

CONCERNING THE ADOPTION OF UNIFORM CONDITIONS OF APPROVAL AND RECIPROCAL RECOGNITION OF APPROVAL FOR MOTOR VEHICLE EQUIPMENT AND PARTS

done at Geneva on 20 March 1958

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UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLE HEADLAMPS EMITTING AN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH AND EQUIPPED WITH HALOGEN FILAMENT LAMPS (H_4 LAMPS)

UNITED NATIONS

Regulation No. 20

UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLE HEADLAMPS EMITTING AN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH AND EQUIPPED WITH HALOGEN FILAMENT LAMPS (H_4 LAMPS)

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A. ADMINISTRATIVE PROVISIONS

SCOPE 1/

This Regulation applies to motor vehicle headlamps which may incorporate lenses of glass or plastic material.

1. DEFINITIONS

For the purpose of this Regulation,

1.1. "Lens" means the outermost component of the headlamp (unit) which transmits light through the illuminating surface;

1.2. "Coating" means any product or products applied in one or more layers to the outer face of a lens;

1.3. Headlamps of different "types" are headlamps which differ in such essential respects as:

1.3.1. the trade name or mark;

1.3.2. the characteristics of the optical system;

1.3.3. the inclusion or elimination of components capable of altering the optical effects by reflection, refraction, absorption and/or deformation during operation. However, the fitting or elimination of filters intended solely to change the colour of the beam but not its light distribution does not entail a change of type;

1.3.4. suitability for right-hand or left-hand traffic or for both traffic systems;

1.3.5. the kind of beam produced (passing beam, driving beam or both);

1.3.6. the materials constituting the lenses and coating, if any.

1/ Nothing in this Regulation shall prevent a Party to the Agreement applying this Regulation from prohibiting the combination of a headlamp incorporating a lens of plastic material approved under this Regulation with a mechanical headlamp-cleaning device (with wipers).

2. APPLICATION FOR APPROVAL OF A HEADLAMP 2/

2.1. The application for approval shall be submitted by the owner of the trade name or mark or by his duly accredited representative. It shall specify:

2.1.1. whether the headlamp is intended to provide both a passing beam and a driving beam or only one of these beams;

2.1.2. whether, if the headlamp is intended to provide a passing beam, it is designed for both left-hand and right-hand traffic or for either left-hand or right-hand traffic only.

2.2. Every application for approval shall be accompanied by:

2.2.1. drawings in triplicate in sufficient detail to permit identification of the type and representing a frontal view of the headlamp, with details of lens ribbing if any, and the cross-section; the drawings shall indicate the space reserved for the approval mark;

2.2.2. a brief technical description;

2.2.3. two samples of the type of headlamp;

2.2.3.1. for the testing of a coloured filter or coloured screen (or of a coloured lens): two samples.

2.2.4. For the test of plastic material of which the lenses are made:

2.2.4.1. thirteen lenses;

2.2.4.1.1. six of these lenses may be replaced by six samples of material at least 60 x 80 mm in size, having a flat or convex outer surface and a substantially flat area (radius of curvature not less than 300 mm) in the middle measuring at least 15 x 15 mm;

2.2.4.1.2. every such lens or sample of material shall be produced by the method to be used in mass production;

2.2.4.2. a reflector to which the lenses can be fitted in accordance with the manufacturer's instructions.

2.3. The materials making up the lenses and coatings, if any, shall be accompanied by the test report of the characteristics of these materials and coatings if they have already been tested.

2/ Application for approval of a filament lamp: see Regulation No. 37.

2.4. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

3. MARKINGS 3/

3.1. Headlamps submitted for approval shall bear the trade name or mark of the applicant.

3.2. They shall comprise, on the lens and on the main body, 4/ spaces of sufficient size for the approval mark and the additional symbols referred to in paragraph 4; these spaces shall be indicated on the drawings referred to in paragraph 2.2.1. above.

3.3. Headlamps designed to satisfy the requirements both of right-hand and of left-hand traffic shall bear markings indicating the two settings of the optical unit on the vehicle or of the filament lamp on the reflector; these markings shall consist of the letters "R/D" for the position for right-hand traffic and the letters "L/G" for the position for left-hand traffic.

4. APPROVAL

4.1. General

4.1.1. If all the samples of a type of headlamp submitted pursuant to paragraph 2 above satisfy the provisions of this Regulation, approval shall be granted.

4.1.2. Where grouped, combined or reciprocally incorporated lamps satisfy the requirements of more than one Regulation, a single international approval mark may be affixed provided that each of the grouped, combined or reciprocally incorporated lamps satisfies the provisions applicable to it.

4.1.3. An approval number shall be assigned to each type approved. Its first two digits (at present 02) shall indicate the series of amendments incorporating the most recent major technical amendments

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3/ In the case of headlamps designed to meet the requirements of traffic moving on one side of the road only (either right or left), it is further recommended that the area which can be occulted to prevent discomfort to users in a country where traffic moves on the side of the road opposite to that of the country for which the headlamp was designed should be outlined indelibly on the front lens. This marking is not necessary, however, where the area is clearly apparent from the design.

4/ If the lens cannot be detached from the main body of the headlamp, a space on the lens shall be sufficient.

made to the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of headlamp covered by this Regulation, except if the approval is extended to a device which only differs from the already approved device by the colour of the light emitted.

4.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of headlamp pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in annex 1 to this Regulation.

4.1.5. In addition to the mark prescribed in paragraph 3.1, an approval mark as described in paragraphs 4.2. and 4.3. below shall be affixed in the spaces referred to in paragraph 3.2. above to every headlamp conforming to a type approved under this Regulation.

4.2. Composition of the approval mark

The approval mark shall consist of:

4.2.1. An international approval marking, comprising:

4.2.1.1. a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval; 5/

4.2.1.2. the approval number prescribed in paragraph 4.1.3. above;

4.2.2. the following additional symbol (or symbols):

4.2.2.1. on headlamps meeting left-hand traffic requirements only, a horizontal arrow pointing to the right of an observer facing the headlamp, i.e. to the side of the road on which the traffic moves;

4.2.2.2. on headlamps designed to meet the requirements of both traffic systems by means of an appropriate adjustment of the setting of the

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5/ 1 for Germany, 2 for France, 3 for Italy, 4 for the Netherlands, 5 for Sweden, 6 for Belgium, 7 for Hungary, 8 for Czech and Slovak Federal Republic, 9 for Spain, 10 for Yugoslavia, 11 for the United Kingdom, 12 for Austria, 13 for Luxembourg, 14 for Switzerland, 15 (vacant), 16 for Norway, 17 for Finland, 18 for Denmark, 19 for Romania, 20 for Poland, 21 for Portugal and 22 for the Russian Federation. Subsequent numbers will be assigned to other countries in the chronological order in which they ratify or accede to the Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, and the numbers thus assigned shall be communicated to the Contracting Parties to the Agreement by the Secretary-General of the United Nations.

optical unit or the filament lamp, a horizontal arrow with a head on each end, the heads pointing respectively to the left and to the right;

4.2.2.3. on headlamps meeting the requirements of this Regulation in respect of the passing beam only, the letters "HC";

4.2.2.4 on headlamps meeting the requirements of this Regulation in respect of the driving beam only, the letters "HR";

4.2.2.5. on headlamps meeting the requirements of this Regulation in respect of both the passing beam and the driving beam, the letters "HCR";

4.2.2.6. on headlamps incorporating a lens of plastic material, the group of letters "PL" to be affixed near the symbols prescribed in paragraphs 4.2.2.3. to 4.2.2.5. above;

4.2.2.7. on headlamps meeting the requirements of this Regulation in respect of the driving beam, an indication of the maximum luminous intensity expressed by a reference mark, as defined in paragraph 6.3.2.1.2. below, placed near the circle surrounding the letter "E";

In the case of reciprocally incorporated headlamps, indication of the maximum luminous intensity of the driving beams as a whole shall be expressed as above.

4.2.3. In every case the relevant operating mode used during the test procedure according to paragraph 1.1.1.1. of annex 5 and the permitted voltage(s) according to paragraph 1.1.1.2. of annex 5 shall be stipulated on the approval forms and on the communication forms transmitted to the countries which are Contracting Parties to the Agreement and which apply this Regulation.

In the corresponding cases the device shall be marked as follows:

4.2.3.1. On headlamps meeting the requirements of this Regulation which are so designed that the filament of the passing beam shall not be lit simultaneously with that of any other lighting function with which it may be reciprocally incorporated: an oblique stroke (/) shall be placed behind the passing lamp symbol in the approval mark.

4.2.3.2. On headlamps meeting the requirements of annex 5 to this Regulation only when supplied with a voltage of 6 V or 12 V, a symbol consisting of the number 24 crossed out by an oblique cross (x), shall be placed near the filament lamp holder.

4.2.4. The two digits of the approval number (at present 02) which indicate the series of amendments incorporating the most recent

major technical amendments made to the Regulation at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols.

4.2.5. The marks and symbols referred to in paragraphs 4.2.1. and 4.2.2. above shall be clearly legible and be indelible even when the headlamp is fitted in the vehicle.

4.3. Arrangement of the approval mark

4.3.1. Independent lamps

Annex 3, figures 1 to 9, to this Regulation gives examples of arrangements of the approval mark with the above-mentioned additional symbols.

4.3.2. Grouped, combined or reciprocally incorporated lamps

4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be affixed, consisting of a circle surrounding the letter "E" followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:

4.3.2.1.1. it is visible after their installation;

4.3.2.1.2. no part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.

4.3.2.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval, and if necessary, the required arrow shall be marked:

4.3.2.2.1. either on the appropriate light-emitting surface,

4.3.2.2.2. or in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified (see four possible examples in annex 3).

4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.

4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.

4.3.2.5. Annex 3, figure 10, to this Regulation gives examples of arrangements of approval marks for grouped, combined or reciprocally incorporated lamps with all the above-mentioned additional symbols.

4.3.3. Lamps, the lens of which are used for different types of headlamps and which may be reciprocally incorporated or grouped with other lamps

The provisions laid down in paragraph 4.3.2. above are applicable.

4.3.3.1. In addition, where the same lens is used, the latter may bear the different approval marks relating to the different types of headlamps or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.2. above and bears the approval marks of the actual functions.

If different types of headlamps comprise the same main body, the latter may bear the different approval marks.

4.3.3.2. Annex 3, figure 11, to this Regulation gives examples of arrangements of approval marks relating to the above case.

B. TECHNICAL REQUIREMENTS FOR HEADLAMPS 6/

5. GENERAL SPECIFICATIONS

5.1. Each sample shall conform to the specifications set forth in paragraphs 6. to 8. below.

5.2. Headlamps shall be so made as to retain their prescribed photometric characteristics and to remain in good working order when in normal use, in spite of the vibrations to which they may be subjected.

5.2.1. Headlamps shall be fitted with a device enabling them to be so adjusted on the vehicles as to comply with the rules applicable to them. Such a device need not be fitted on units in which the reflector and the diffusing lens cannot be separated, provided the use of such units is confined to vehicles on which the headlamp setting can be adjusted by other means.

6/ Technical requirements for filament lamps: see Regulation No. 37.

Where a headlamp providing a passing beam and a headlamp providing a driving beam, each equipped with its own filament lamp, are assembled to form a composite unit the adjusting device shall enable each optical system individually to be duly adjusted.

5.2.2. However, these provisions shall not apply to headlamp assemblies whose reflectors are indivisible. For this type of assembly the requirements of paragraph 6.3. of this Regulation shall apply.

5.3. The components by which the filament lamp is fixed to the reflector shall be so made that, even in darkness, the filament lamp can be fixed in no position but the correct one. 7/ The filament lamp holder shall conform to the characteristics given on data sheet 7005-39-1 of IEC Publication 61-2, third edition, 1969.

5.4. Headlamps designed to satisfy the requirements both of right-hand and of left-hand traffic may be adapted for traffic on a given side of the road either by an appropriate initial setting when fitted on the vehicle or by selective setting by the user. Such initial or selective setting may consist, for example, of fixing either the optical unit at a given angle on the vehicle or the filament lamp at a given angle in relation to the optical unit. In all cases, only two different and clearly distinct settings, one for right-hand and one for left-hand traffic, shall be possible, and the design shall preclude inadvertent shifting from one setting to the other or setting in an intermediate position. Where two different setting positions are provided for the filament lamp, the components for attaching the filament lamp to the reflector must be so designed and made that, in each of its two settings, the filament lamp will be held in position with the precision required for headlamps designed for traffic on only one side of the road. Conformity with the requirements of this paragraph shall be verified by visual inspection and, where necessary, by a test fitting.

5.5. Complementary tests shall be done according to the requirements of annex 5 to ensure that in use there is no excessive change in photometric performance.

5.6. If the lens of the headlamp is of plastic material, tests shall be done according to the requirements of annex 6.

7/ A headlamp is regarded as satisfying the requirements of this paragraph if the filament lamp can be easily fitted into the headlamp and the feather keys can be correctly fitted into their slots even in darkness.

6. ILLUMINATION

6.1. General provisions

6.1.1. Headlamps shall be so made that with suitable H_4 filament lamps they give adequate illumination without dazzle when emitting the passing beam, and good illumination when emitting the driving beam.

6.1.2. The illumination produced by the headlamp shall be determined by means of a vertical screen set up 25 m forward of the headlamp and at right angles to its axes as shown in annex 4 to this Regulation.

6.1.3. The headlamps shall be checked by means of an uncoloured standard (reference) filament lamp designed for a rated voltage of 12 V. In the case of headlamps which may be fitted with selective-yellow filters, 8/ such filters shall be replaced by geometrically identical uncoloured filters with a transmission factor of at least 80%. During the checking of the headlamp, the voltage at the terminals of the filament lamp must be regulated so as to obtain the following characteristics:

	Consumption in watts	Light flux in lumens
passing filament	about 55	750
driving filament	about 60	1 250

The headlamp shall be considered acceptable if it meets the requirements of this paragraph 6 with at least one standard (reference) filament lamp, which may be submitted with the headlamp.

6.1.4. The dimensions determining the position of the filaments inside the standard filament lamp are shown in the relevant data sheets of Regulation No. 37.

6.1.5. The bulb of the standard filament lamp must be of such shape and optical quality that it does not cause any reflection or refraction adversely affecting the light distribution. Compliance with this requirement shall be checked by measuring the light distribution obtained when a standard (reference) headlamp is fitted with the standard (reference) filament lamp (see paragraph 9 below).

8/ These filters shall consist of all the components, including the lens, intended to colour the light (except those forming part of the filament lamp itself).

6.2. Provisions concerning passing beams

6.2.1. The passing beam must produce a sufficiently sharp "cut-off" to permit a satisfactory adjustment with its aid. The "cut-off" must be a horizontal straight line on the side opposite to the direction of the traffic for which the headlamp is intended; on the other side, it must not extend beyond either the broken line HV H_1 H_4 formed by a straight line HV H_1 making a 45° angle with the horizontal and the straight line H_1 H_4, 25 cm above the straight line hh, or the straight line HV H_3, inclined at an angle of 15° above the horizontal (see annex 4). A "cut-off" extending beyond both line HV H_2 and line H_2H_4 and resulting from a combination of the two above possibilities shall in no circumstances be permitted.

6.2.2. The headlamp shall be so aimed that

6.2.2.1. in the case of headlamps designed to meet the requirements of right-hand traffic, the "cut-off" on the left-half of the screen 9/ is horizontal and, in the case of headlamps designed to meet the requirements of left-hand traffic, the "cut-off" on the right-half of the screen is horizontal;

6.2.2.2. this horizontal part of the "cut-off" is situated on the screen 25 cm below the level hh (see annex 4);

6.2.2.3. the "elbow" of the "cut-off" is on line vv. 10/

6.2.3. When so aimed, the headlamp need, if its approval is sought solely for provision of a passing beam, 11/ comply only with the requirements set out in paragraphs 6.2.5. to 6.2.7. below; if it is intended to provide both a passing beam and a driving beam, it shall comply with the requirements set out in paragraphs 6.2.5. to 6.2.7. and 6.3.

6.2.4. Where a headlamp so aimed does not meet the requirements set out in paragraphs 6.2.5. to 6.2.7. and 6.3., its alignment may be changed, provided that the axis of the beam is not displaced laterally by

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9/ The test screen must be sufficiently wide to allow examination of the "cut-off" over a range of at least 5° on either side of the line vv.

10/ If the beam does not have a cut-off with a clear "elbow", the lateral adjustment shall be effected in the manner which best satisfies the requirements for illumination at points 75 R and 50 R for right-hand traffic and for points 75 L and 50 L for left-hand traffic.

11/ Such a special "passing beam" headlamp may incorporate a driving beam not subject to requirements.

more than 1° (≈ 44 cm) to the right or left. 12/ To facilitate alignment by means of the "cut-off", the headlamp may be partially occulted in order to sharpen the "cut-off".

6.2.5. The illumination produced on the screen by the passing beam shall meet the following requirements:

Point on measuring screen		Required illumination in lux
Headlamps for right-hand traffic	Headlamps for left-hand traffic	
Point B 50 L	Point B 50 R	≤ 0.4
" 75 R	" 75 L	≥ 12
" 75 L	" 75 R	≤ 12
" 50 L	" 50 R	≤ 15
" 50 R	" 50 L	≥ 12
" 50 V	" 50 V	≥ 6
" 25 L	" 25 R	≥ 2
" 25 R	" 25 L	≥ 2
Any point in zone III		≤ 0.7
Any point in zone IV		≥ 3
Any point in zone I ≤ 2 x (E_{50R} or E_{50L})*		

* E_{50R} and E_{50L} are the illuminations actually measured.

6.2.6. There shall be no lateral variations detrimental to good visibility in any of the zones I, II, III and IV.

12/ The limit of realignment of 1° towards the right or left is not incompatible with upward or downward vertical realignment. The latter is limited only by the requirements of paragraph 6.3. However, the horizontal part of the "cut-off" should not extend beyond the line hh (the provisions of paragraph 6.3. are not applicable to headlamps intended to meet the requirements of this Regulation only for provision of a passing beam).

6.2.7. The illumination values in zones "A" and "B" as shown in figure C in annex 4 shall be checked by the measurement of the photometric values of points 1 to 8 on this figure; these values shall lie within the following limits:

0.7 lux ≥ 1, 2, 3, 7 ≥ 0.1 lux
0.7 lux ≥ 4, 5, 6, 8 ≥ 0.2 lux

6.2.8. Headlamps designed to meet the requirements of both right-hand and left-hand traffic must, in each of the two setting positions of the optical unit or of the filament lamp, meet the requirements set forth above for the corresponding direction of traffic.

6.3. Provisions concerning driving beams

6.3.1. In the case of a headlamp designed to provide a driving beam and a passing beam, measurements of the illumination produced on the screen by the driving beam shall be taken with the same headlamp alignment as for measurements under paragraphs 6.2.5. to 6.2.7. above; in the case of a headlamp providing a driving beam only, it shall be so adjusted that the area of maximum illumination is centred on the point of intersection of lines hh and vv; such a headlamp need meet only the requirements referred to in paragraph 6.3. Where more than one light source is used to provide the driving beam, the combined functions shall be used to determine the maximum value of the illumination (E_M).

6.3.2. The illumination produced on the screen by the driving beam shall meet the following requirements.

6.3.2.1. The point of intersection (HV) of lines hh and vv shall be situated within the isolux 80% of maximum illumination. This maximum value (E_M) shall not be less than 48 lux. The maximum value shall in no circumstances exceed 240 lux; in addition, in the case of a combined passing and driving headlamp, this maximum value shall not be more than 16 times the illumination measured for the passing beam at point 75 R (or 75 L).

6.3.2.1.1. The maximum intensity (I_M) of the driving beam expressed in thousands of candelas shall be calculated by the formula

$$I_M = 0.625\ E_M$$

6.3.2.1.2. The reference mark (I'_M) of this maximum intensity, referred to in paragraph 4.2.2.7. above, shall be obtained by the ratio

$$I'_M = \frac{I_M}{3} = 0.208 E_M$$

This value shall be rounded off to the value 7.5 - 10 - 12.5 - 17.5 - 20 - 25 - 27.5 - 30 - 37.5 - 40 - 45 - 50.

6.3.2.2. Starting from point HV, horizontally to the right and left, the illumination shall be not less than 24 lux up to a distance of 1.125 m and not less than 6 lux up to a distance of 2.25 m.

6.4. The screen illumination values mentioned in paragraphs 6.2.5. to 6.2.7. and 6.3. above shall be measured by means of a photo-receptor, the effective area of which shall be contained within a square of 65 mm side.

7. PROVISIONS CONCERNING COLOURED LENSES AND FILTERS

7.1. Approval may be obtained for headlamps emitting either white or selective-yellow lights with an uncoloured filament lamp. Expressed in CIE trichromatic coordinates, the corresponding colorimetric characteristics for yellow lenses or filters are as follows:

Selective-yellow filter (screen or lens)

Limit towards red	y	$\geq 0.138 + 0.58\ x$
Limit towards green	y	$\leq 1.29\ x - 0.1$
Limit towards white	y	$\geq -x + 0.966$
Limit towards spectral value	y	$\leq -x + 0.992$

which can also be expressed as follows:

dominant wave-length	575 - 585 n m
purity factor	0.90 - 0.98

The transmission factor must be ≥ 0.78

The transmission factor shall be determined by using a light source with a colour temperature of 2,856 K. 13/

7.2. The filter must be part of the headlamp, and must be attached to it in such a way that the user cannot remove it either inadvertently or, with ordinary tools, intentionally.

13/ Corresponding to illuminant A of the International Commission on Illumination (CIE).

8. GAUGING OF DISCOMFORT

The discomfort caused by the passing beam of headlamps shall be gauged. 14/

9. STANDARD (REFERENCE) HEADLAMP 15/

A headlamp shall be deemed to be a standard (reference) headlamp if it

9.1. satisfies the above-mentioned requirements for approval;

9.2. has an effective diameter of not less than 160 mm;

9.3. provides, with a standard (reference) filament lamp, at the various points and in the various zones referred to in paragraph 6.2.5., illumination equal to:

9.3.1. not more than 90% of the maximum limits, and

9.3.2. not less than 120% of the minimum limits, prescribed in the table in paragraph 6.2.5.

10. OBSERVATION CONCERNING COLOUR

Since any approval under this Regulation is granted, pursuant to paragraph 7.1. above, for a type of headlamp emitting either white light or selective-yellow light, article 3 of the Agreement to which the Regulation is annexed shall not prevent the Contracting Parties from prohibiting headlamps emitting a beam of white or selective-yellow light on vehicles registered by them.

C. FURTHER ADMINISTRATIVE PROVISIONS

11. MODIFICATION OF THE HEADLAMP TYPE AND EXTENSION OF APPROVAL

11.1. Every modification of the headlamp type shall be notified to the administrative department which approved the headlamp type. The said department may then either:

11.1.1. Consider that the modifications made are unlikely to have appreciable adverse effects and that in any event the headlamp still complies with the requirements; or

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14/ This requirement will be the subject of a recommendation to administrations.

15/ Different values may be accepted provisionally. In the absence of definitive specifications, the use of an approved headlamp is recommended.

11.1.2. Require a further test report from the technical service responsible for conducting the tests.

11.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.4. above to the Parties tc the Agreement which apply this Regulation.

11.3. The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.

12. CONFORMITY OF PRODUCTION

Every headlamp bearing an approval mark as provided for in this Regulation must conform to the approval type and meet the photometric requirements set forth above. As regards headlamps, compliance with this provision shall be verified in accordance with annex 2 and, if applicable, paragraph 3 of annex 6 to this Regulation.

12.1. Existing approvals granted under this Regulation before 3 July 1986 shall remain valid.

13. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

13.1. The approval granted in respect of a type of headlamp pursuant to this Regulation may be withdrawn if the requirements are not complied with or if a headlamp bearing the approval mark does not conform to the type approved.

13.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.

14. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of headlamp approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in annex 1 to this Regulation.

15. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

The Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitely discontinued, issued in other countries, are to be sent.

Annex 1

COMMUNICATION

maximum format: A4 (210 x 297 mm)

issued by: Name of administration

.....

.....

.....

concerning: 2/ APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a type of headlamp pursuant to Regulation No. 20

Approval No. ... Extension No. ...

1. Trade name or mark of the device: .....

2. Manufacturer's name for the type of device: .....

3. Manufacturer's name and address: .....

4. If applicable, name and address of the manufacturer's representative:

.....

5. Submitted for approval on: .....

6. Technical service responsible for conducting approval tests: .....

.....

7. Date of test report: .....

8. Number of test report: .....

9. Brief description:

Category as described by the relevant marking: 3/ .....

.....

Colour of light emitted: white/selective yellow 2/

10. Position of the approval mark: .....

11. Reason(s) for extension (if applicable): .....

12. Approval granted/refused/extended/withdrawn: 2/ .....

13. Place: .....

14. Date: .....

15. Signature: .....

16. The list of documents deposited with the Administrative Service which has granted approval is annexed to this communication and may be obtained on request.

1/ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

2/ Strike out what does not apply.

3/ Indicate the appropriate marking selected from the list below:

HC, HC, HC, HR, HR PL, HCR, HCR, HCR,
—> <-> —> <—>

HC/R, HC/R, HC/R, HC/, HC/, HC/, HC PL, HC PL, HC PL,
——> <——> —> <—> ——> <——>

HCR PL, HCR PL, HCR PL, HC/R PL, HC/R PL, HC/R PL,
——> <——> ——> <——>

HC/PL, HC/PL, HC/PL
——> <——>

Annex 2

VERIFICATION OF CONFORMITY OF PRODUCTION OF HEADLAMPS EQUIPPED WITH H_4 FILAMENT LAMPS

1. Headlamps bearing an approval mark shall conform to the approved type.

2. The requirement of conformity shall be deemed satisfied from a mechanical and geometrical standpoint if the discrepancies do not exceed inevitable manufacturing errors.

3. As regards photometric performance, the conformity of headlamps of the series will not be contested if, during photometric tests of any headlamp, selected at random and equipped with a standard (reference) filament lamp,

3.1. none of the values measured deviates unfavourably by more than 20% from the prescribed value (for values B 50 R or L and zone III, the maximum unfavourable deviation may be 0.2 lux (B 50 R or L), or 0.3 lux (zone III));

3.2. or if

3.2.1. for the passing beam, the prescribed values are met at HV (with a tolerance of 0.2 lux) and at least one point of the area delimited on the measuring screen (at 25 m) by a circle of 15 cm in radius around points B 50 R or L (with a tolerance of 0.1 lux), 75 R or L, 50 R or L, 25 R or L, and in the entire area of zone IV which is not more than 22.5 cm above line 25 R and 25 L,

3.2.2. and if, for the driving beam, HV being situated within the isolux 0.75 E_{max}, a tolerance of 20% is observed for the photometric values. 1/

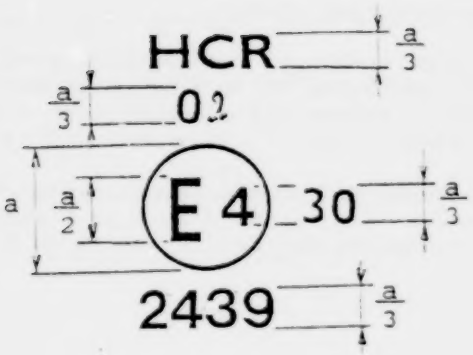
4. If the results of the tests described in paragraph 3 above do not satisfy the requirements, the tests for the headlamp in question shall be repeated with another standard (reference) filament lamp.

5. See also annex 5, paragraph 3 and, if applicable, annex 6, paragraph 3 to this Regulation.

1/ The determination of the maximum value (16) of the ratio between the maximum illumination of the driving beam and the illumination at point 75 R (or 75 L) provided for in paragraph 6.3.2.1. of this Regulation is solely for the purpose of seeing whether the type of headlamp has the desired characteristics; no such check need be made during verification of conformity of production.

Annex 3

EXAMPLES OF ARRANGEMENTS OF APPROVAL MARKS



a = 12 mm min.

Figure 1

The headlamp bearing the approval marking shown above is a headlamp approved in the Netherlands (E4), under approval number 2439, meeting the requirements of this Regulation, as amended by the 02 series of amendments (02), in respect of both the driving beam and the passing beam (HCR) and which is designed for right-hand traffic only.

The figure 30 indicates that the maximum intensity of the driving beam is between 86,250 and 101,250 candelas.

Note: The approval number and the additional symbols shall be placed close to the circle and either above or below the letter 'E', or to the right or left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face the same direction.

The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

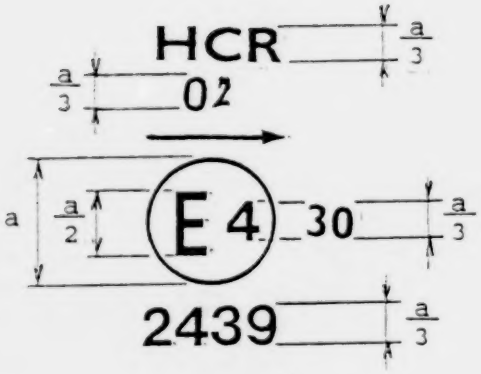
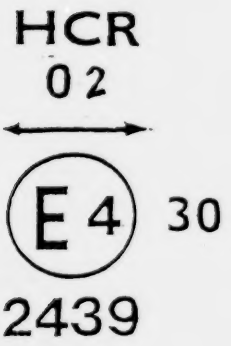


Figure 2



a = 12 mm min.

Figure 3a

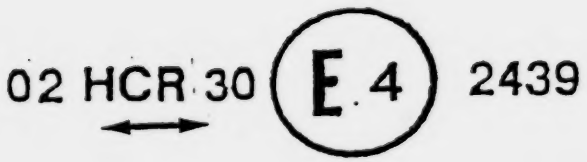


Figure 3b

The headlamp bearing the approval marking shown above is a headlamp meeting the requirements of this Regulation with respect to both the passing beam and the driving beam and designed:

For left-hand traffic only.	For both traffic systems, by means of an adjustment as desired of the setting of the optical unit or the filament lamp.

a = 12 mm min.

Figure 4

Figure 5

The headlamp bearing the approval mark shown above is a headlamp incorporating the lens of plastic material meeting the requirements of this Regulation with respect to the passing beam only, and designed:

For both traffic systems. | For right-hand traffic only.

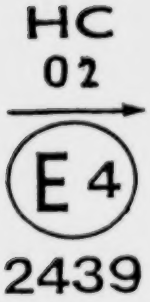


Figure 6

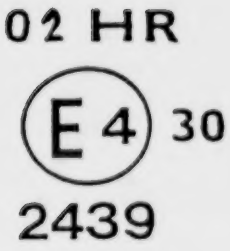


Figure 7

The headlamp bearing the approval mark shown above is a headlamp meeting the requirements of this Regulation:

With respect to the passing beam only, and designed for left-hand traffic only.	With respect to the driving beam only.

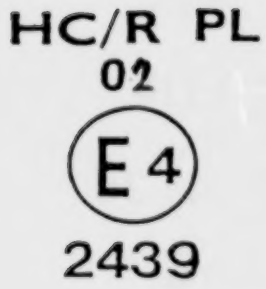


Figure 8

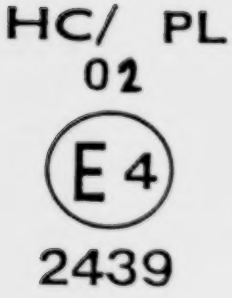


Figure 9

Identification of a headlamp incorporating the lens of plastic material meeting the requirements of Regulation No. 20:

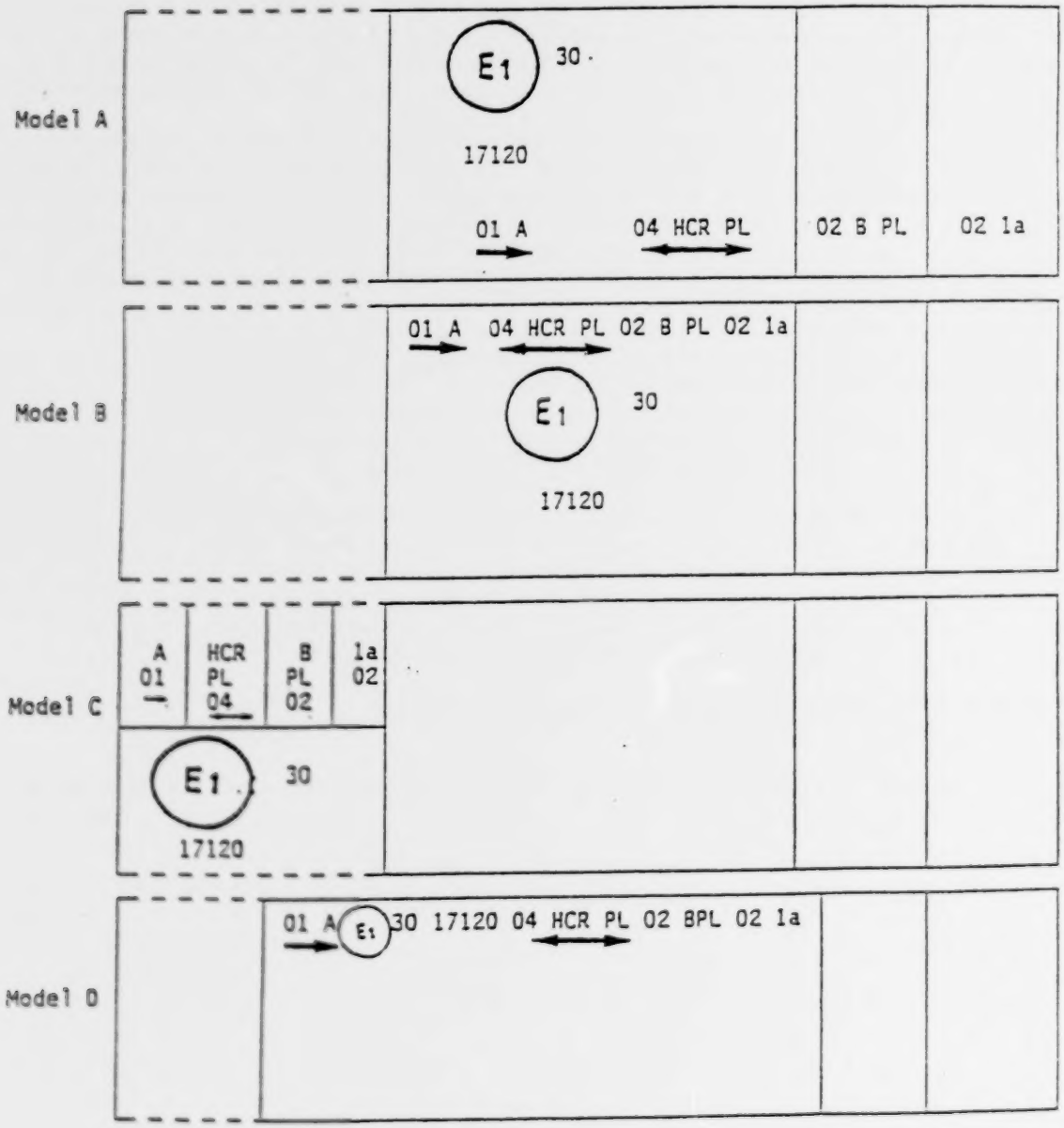
For both the passing beam and the driving beam and designed for right-hand traffic only.	For the passing beam only and designed for left-hand traffic only.

The passing lamp filament shall not be lit simultaneously with the driving lamp filament and/or any other headlamp with which it is reciprocally incorporated.

Simplified marking for grouped, combined or reciprocally incorporated lamps

Figure 10

(The vertical and horizontal lines schematize the shape of the light-signalling device. They are not part of the approval mark).



NOTE: The four examples shown above correspond to a lighting device bearing an approval mark relating to:

A front position lamp approved in accordance with the 01 series of amendments to Regulation No. 7;

A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86,250 and 101,250 candelas (as indicated by the number 30), approved in accordance with the 02 series of amendments to Regulation No. 20 and incorporating a lens of plastic material;

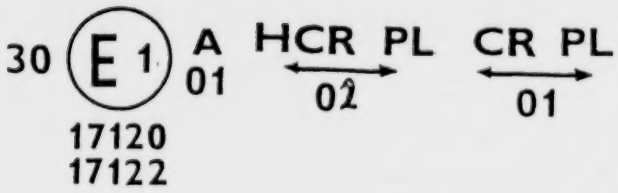
A front fog lamp approved in accordance with the 02 series of amendments to Regulation No. 19 and incorporating a lens of plastic material;

A front direction indicator lamp of category 1a approved in accordance with the 02 series of amendments to Regulation No. 6.

Lamp reciprocally incorporated with a headlamp

Figure 11

Example 1



The above example corresponds to the marking of a lens of plastic material intended to be used in different types of headlamps, namely:

either: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86,250 and 101,250 candelas, approved in Germany (E1) in accordance with the requirements of Regulation No. 20 as amended by the 02 series of amendments, which is reciprocally incorporated with
a front position lamp approved in accordance with the 01 series of amendments to Regulation No. 7;

or: a headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Germany (E1) in accordance with the requirements of Regulation No. 1 as amended by the 01 series of amendments, which is reciprocally incorporated with
the same front position lamp as above;

or even: either of the above-mentioned headlamps approved as a single lamp.

The main body of the headlamp shall bear the only valid approval number, for instance:

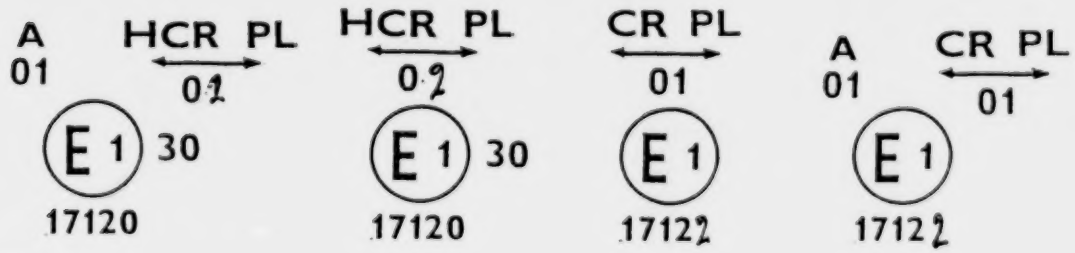
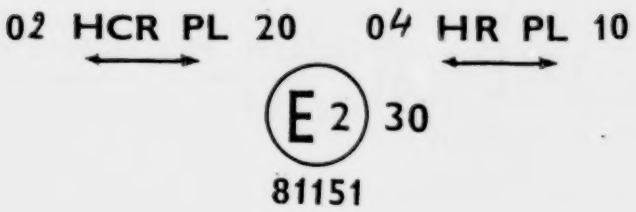


Figure 11 (continued)

Example 2

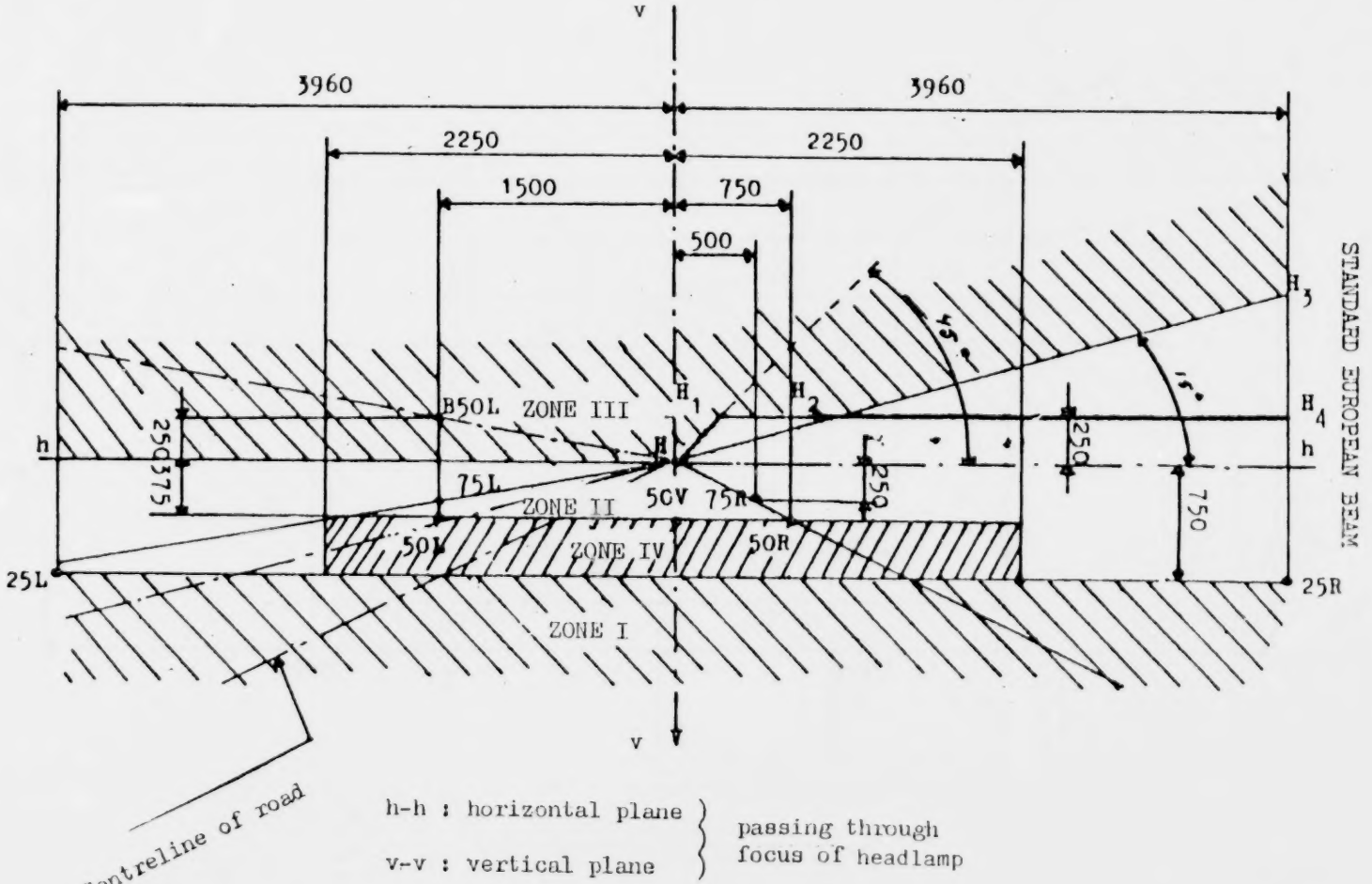


The above example corresponds to the marking of a lens of plastic material used in an assembly of two headlamps approved in France (E2), consisting of a headlamp emitting a passing beam designed for both traffic systems and of a driving beam with a maximum intensity comprised between x and y candelas, meeting the requirements of Regulation No. 20, and of a headlamp emitting a driving beam with a maximum intensity comprised between w and z candelas, meeting the requirements of Regulation No. 8 or Regulation No. 20, the maximum intensity of all the driving beams being comprised between 86,250 and 101,250 candelas.

Annex 4

MEASURING SCREEN

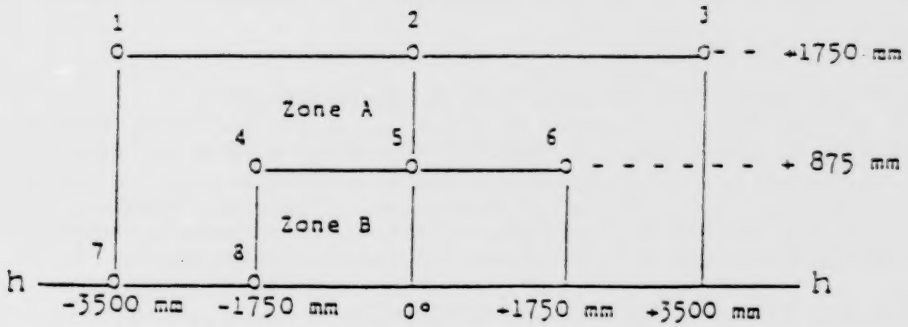
A. Headlamp for right-hand traffic
(Dimensions in mm)



STANDARD EUROPEAN BEAM

B. Headlamp for left-hand traffic
(Dimensions in mm)

Figure C



Note: Figure C shows the measuring points for right-hand traffic.
Points 7 and 8 move to their corresponding location at the right-hand side of the picture for left-hand traffic.

Annex 5

TESTS FOR STABILITY OF PHOTOMETRIC PERFORMANCE OF HEADLAMPS IN OPERATION

TESTS ON COMPLETE HEADLAMPS

Once the photometric values have been measured according to the prescriptions of this Regulation, in the point for E_{max} for driving beam and in points HV, 50 R, B 50 L for passing beam (or HV, 50 L, B 50 R for headlamps designed for left-hand traffic) a complete headlamp sample shall be tested for stability of photometric performance in operation. "Complete headlamp" shall be understood to mean the complete lamp itself including those surrounding body parts and lamps which could influence its thermal dissipation.

1. TEST FOR STABILITY OF PHOTOMETRIC PERFORMANCE

The tests shall be carried out in a dry and still atmosphere at an ambient temperature of 23° C ± 5° C, the complete headlamp being mounted on a base representing the correct installation on the vehicle.

1.1. Clean headlamp

The headlamp shall be operated for 12 hours as described in subparagraph 1.1.1. and checked as prescribed in subparagraph 1.1.2.

1.1.1. Test procedure

The headlamp shall be operated for a period according to the specified time, so that:

1.1.1.1.

(a) In the case where only one lighting function (driving or passing beam) is to be approved, the corresponding filament is lit for the prescribed time, 2/

(b) In the case of a reciprocally incorporated passing lamp and driving lamp (dual filament lamp or two filament lamps):

If the applicant declares that the headlamp is to be used with a single filament lit 1/ at a time, the test shall be

---

1/ Should two or more lamp filaments be simultaneously lit when headlamp flashing is used, this shall not be considered as being normal use of the filaments simultaneously.

2/ When the tested headlamp is grouped and/or reciprocally incorporated with signalling lamps, the latter shall be lit for the duration of the test. In the case of a direction indicator lamp, it shall be lit in flashing operation mode with an on/off time ratio of approximately one to one.

carried out in accordance with this condition, activating 2/ each specified function successively for half the time specified in paragraph 1.1.;

In all other cases, 1/ 2/ the headlamp shall be subjected to the following cycle until the time specified is reached:

15 minutes, passing-beam filament lit
5 minutes, all filaments lit;

(c) In the case of grouped lighting functions all the individual functions shall be lit simultaneously for the time specified for individual lighting functions (a), also taking into account the use of reciprocally incorporated lighting functions (b), according to the manufacturer's specifications.

1.1.1.2. Test voltage

The voltage shall be adjusted so as to supply 90 per cent of the maximum wattage specified in the Regulation for filament lamps (Regulation No. 37).

The applied wattage shall in all cases comply with the corresponding value of a filament lamp of 12 V rated voltage, except if the applicant for approval specifies that the headlamp may be used at a different voltage. In the latter case, the test shall be carried out with the filament lamp whose wattage is the highest that can be used.

1.1.2. Test results

1.1.2.1. Visual inspection

Once the headlamp has been stabilized to the ambient temperature, the headlamp lens and the external lens, if any, shall be cleaned with a clean, damp cotton cloth. It shall then be inspected visually; no distortion, deformation, cracking or change in colour of either the headlamp lens or the external lens, if any, shall be noticeable.

1.1.2.2. Photometric test

To comply with the requirements of this Regulation, the photometric values shall be verified in the following points:

Passing beam:

50 R - B 50 L - HV for headlamps designed for right-hand traffic,
50 L - B 50 R - HV for headlamps designed for left-hand traffic.

Driving beam

Point of E_{max}

Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the cut-off line is covered in paragraph 2 of this annex).

A 10 per cent discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure.

1.2. Dirty headlamp

After being tested as specified in subparagraph 1.1. above, the headlamp shall be operated for one hour as described in subparagraph 1.1.1., after being prepared as prescribed in subparagraph 1.2.1., and checked as prescribed in subparagraph 1.1.2.

1.2.1. Preparation of the headlamp

1.2.1.1. Test mixture

The mixture of water and a polluting agent to be applied to the headlamp shall be composed of nine parts (by weight) of silica sand with a grain size distributed between 0 and 100 μm, one part (by weight) of vegetal carbon dust of a grain size distributed between 0 and 100 μm, 0.2 part (by weight) of NaCMC 3/ and an appropriate quantity of distilled water, the conductivity of which is lower than 1 mS/m for the purpose of this test.

The mixture must not be more than 14 days old.

1.2.1.2. Application of the test mixture to the headlamp

The test mixture shall be uniformly applied to the entire light-emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illumination value has dropped to 15-20% of the values measured for each following point under the conditions described in this annex:

Point of E_{max} in passing beam/driving beam and in driving beam only,

---

3/ NaCMC represents the sodium salt of carboxymethylcellulose, customarily referred to as CMC. The NaCMC used in the dirt mixture shall have a degree of substitution (DS) of 0.6-0.7 and a viscosity of 200-300 cP for a 2% solution at 20° C.

50 R and 50 V 4/ for a passing lamp only, designed for right-hand traffic,

50 L and 50 V 4/ for a passing lamp only, designed for left-hand traffic.

1.2.1.3. Measuring equipment

The measuring equipment shall be equivalent to that used during headlamp approval tests. A standard (reference) filament lamp shall be used for the photometric verification.

2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed a specified value for an operating passing lamp.

The headlamp tested in accordance with paragraph 1, shall be subjected to the test described in 2.1., without being removed from or readjusted in relation to its test fixture.

2.1. Test

The test shall be carried out in a dry and still atmosphere at an ambient temperature of 23° C ± 5° C.

Using a mass production filament lamp which has been aged for at least one hour the headlamp shall be operated on passing beam without being dismounted from or readjusted in relation to its test fixture. (For the purpose of this test, the voltage shall be adjusted as specified in paragraph 1.1.1.2.). The position of the cut-off line in its horizontal part (between vv and the vertical line passing through point B 50 L for right-hand traffic or B 50 R for left-hand traffic) shall be verified 3 minutes (r_3) and 60 minutes (r_{60}) respectively after operation.

The measurement of the variation in the cut-off line position as described above shall be carried out by any method giving acceptable accuracy and reproducible results.

2.2. Test results

2.2.1. The result in milliradians (mrad) shall be considered as acceptable for a passing lamp, only when the absolute value $\Delta r_I = | r_3 - r_{III} |$ recorded on the headlamp is not more than 1.0 mrad ($\Delta r_I \leq 1.0$ mrad).

2.2.2. However, if this value is more than 1.0 mrad but not more than 1.5 mrad (1.0 mrad < $\Delta r_I \leq 1.5$ mrad) a second headlamp shall be tested as described in paragraph 2.1. after being subjected three consecutive times to the cycle as described below, in order to stabilize the position of mechanical parts of the headlamp on a base representative of the correct installation on the vehicle:

Operation of the passing beam for one hour, (the voltage shall be adjusted as specified in paragraph 1.1.1.2.),

Period of rest for one hour.

The headlamp type shall be considered as acceptable if the mean value of the absolute values Δr_I measured on the first sample and Δr_{II} measured on the second sample is not more than 1.0 mrad.

$$\left(\frac{\Delta r_I + \Delta r_{II}}{2} \leq 1.0 \text{ mrad} \right)$$

3. CONFORMITY OF PRODUCTION

One of the sampled headlamps shall be tested according to the procedure described in paragraph 2.1. after being subjected three consecutive times to the cycle described in paragraph 2.2.2.

The headlamp shall be considered as acceptable if Δr does not exceed 1.5 mrad.

If this value exceeds 1.5 mrad but is not more than 2.0 mrad, a second headlamp shall be subjected to the test after which the mean of the absolute values recorded on both samples shall not exceed 1.5 mrad.

Annex 6

REQUIREMENTS FOR LAMPS INCORPORATING LENSES OF PLASTIC MATERIAL - TESTING OF LENS OR MATERIAL SAMPLES AND OF COMPLETE LAMPS

1. GENERAL SPECIFICATIONS

1.1. The samples supplied pursuant to paragraph 2.2.4. of Regulations Nos. 1, 8, 19, 20 or paragraph 3.2.4. of Regulations Nos. 5, 31, 57, 72 shall satisfy the specifications indicated in paragraphs 2.1 to 2.5 below.

1.2. The two samples of complete lamps supplied pursuant to paragraph 2.2.3. of Regulations Nos. 1, 8, 19, 20 or paragraph 3.2.3. of Regulations Nos. 5, 31, 57, 72 and incorporating lenses of plastic material shall, with regard to the lens material, satisfy the specifications indicated in paragraph 2.6. below.

1.3. The samples of lenses of plastic material or samples of material shall be subjected, with the reflector to which they are intended to be fitted (where applicable), to approval tests in the chronological order indicated in table A reproduced in appendix 1 to this annex.

1.4. However, if the lamp manufacturer can prove that the product has already passed the tests prescribed in paragraphs 2.1.-2.5. below, or the equivalent tests pursuant to another Regulation, those tests need not be repeated; only the tests prescribed in appendix 1, table B, shall be mandatory.

2. TESTS

2.1. Resistance to temperature changes

2.1.1. Tests

Three new samples (lenses) shall be subjected to five cycles of temperature and humidity (RH = relative humidity) change in accordance with the following programme:

3 hours at 40° C ± 2° C and 85-95% RH;

1 hour at 23° C ± 5° C and 60-75% RH;

15 hours at -30° C ± 2° C;

1 hour at 23° C ± 5° C and 60-75% RH;

3 hours at 80° C ± 2° C;

1 hour at 23° C ± 5° C and 60-75% RH;

Before this test, the samples shall be kept at 23° C ± 5° C and 60-75% RH for at least four hours.

Note: The periods of one hour at 23° C ± 5° C shall include the periods of transition from one temperature to another which are needed in order to avoid thermal shock effects.

2.1.2. Photometric measurements

2.1.2.1. Method

Photometric measurements shall be carried out on the samples before and after the test.

These measurements shall be made using a standard lamp, at the following points:

B 50 L and 50 R for the passing beam of a passing lamp or a passing/driving lamp (B 50 R and 50 L in the case of headlamps intended for left-hand traffic);

E_{max} route for the driving beam of a driving lamp or a passing/driving lamp;

HV and E_{max} zone D for a front fog lamp.

2.1.2.2. Results

The variation between the photometric values measured on each sample before and after the test shall not exceed 10% including the tolerances of the photometric procedure.

2.2. Resistance to atmospheric and chemical agents

2.2.1. Resistance to atmospheric agents

Three new samples (lenses or samples of material) shall be exposed to radiation from a source having a spectral energy distribution similar to that of a black body at a temperature between 5,500K and 6,000K. Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wave lengths smaller than 295 nm and greater than 2,500 nm. The samples shall be exposed to an energetic illumination of 1,200 W/m^2 ± 200 W/m^2 for a period such that the luminous energy that they receive is equal to 4,500 MJ/m^2 ± 200 MJ/m^2. Within the enclosure, the temperature measured on the black panel placed on a

level with the samples shall be 50° C ± 5° C. In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 1/min.

The samples shall be sprayed with distilled water of conductivity lower than 1 mS/m at a temperature of 23° C ± 5° C, in accordance with the following cycle:

spraying: 5 minutes;
drying: 25 minutes.

2.2.2. Resistance to chemical agents

After the test described in paragraph 2.2.1. above and the measurement described in paragraph 2.2.3.1. below have been carried out, the outer face of the said three samples shall be treated as described in paragraph 2.2.2.2. with the mixture defined in paragraph 2.2.2.1. below.

2.2.2.1. Test mixture

The test mixture shall be composed of 61.5% n-heptane, 12.5% toluene, 7.5% ethyl tetrachloride, 12.5% trichloroethylene and 6% xylene (volume per cent).

2.2.2.2. Application of the test mixture

Soak a piece of cotton cloth (as per ISO 105) until saturation with the mixture defined in paragraph 2.2.2.1. above and, within 10 seconds, apply it for 10 minutes to the outer face of the sample at a pressure of 50 N/cm^2, corresponding to an effort of 100 N applied on a test surface of 14 x 14 mm.

During this 10-minute period, the cloth pad shall be soaked again with the mixture so that the composition of the liquid applied is continuously identical with that of the test mixture prescribed.

During the period of application, it is permissible to compensate the pressure applied to the sample in order to prevent it from causing cracks.

2.2.2.3. Cleaning

At the end of the application of the test mixture, the samples shall be dried in the open air and then washed with the solution described in paragraph 2.3. (Resistance to detergents) 23° C ± 5° C.

Afterwards the samples shall be carefully rinsed with distilled water containing not more than 0.2% impurities at 23° C ± 5° C and then wiped off with a soft cloth.

2.2.3. Results

2.2.3.1. After the test of resistance to atmospheric agents, the outer face of the samples shall be free from cracks, scratches, chipping and deformation, and the mean variation in transmission

$\Delta t = \frac{T2 - T3}{T_2}$, measured on the three samples according to the

procedure described in appendix 2 to this annex shall not exceed 0.020

($\Delta t_m \leq 0.020$).

2.2.3.2. After the test of resistance to chemical agents, the samples shall not bear any traces of chemical staining likely to cause a variation of flux diffusion, whose mean variation

$\Delta d = \frac{T5 - T4}{T_2}$, measured on the three samples according to the

procedure described in appendix 2 to this annex shall not exceed 0.020

($\Delta d_m \leq 0.020$).

2.3. Resistance to detergents and hydrocarbons

2.3.1. Resistance to detergents

The outer face of three samples (lenses or samples of material) shall be heated to 50° C ± 5° C and then immersed for five minutes in a mixture maintained at 23° C ± 5° C and composed of 99 parts distilled water containing not more than 0.02% impurities and one part alkylaryl sulphonate.

At the end of the test, the samples shall be dried at 50° C ± 5° C. The surface of the samples shall be cleaned with a moist cloth.

2.3.2. Resistance to hydrocarbons

The outer face of these three samples shall then be lightly rubbed for one minute with a cotton cloth soaked in a mixture composed of 70% n-heptane and 30% toluene (volume per cent), and shall then be dried in the open air.

2.3.3. Results

After the above two tests have been performed successively, the mean value of the variation in transmission

$\Delta t = \frac{T2 - T3}{T_2}$, measured on the three samples according to the procedure described in appendix 2 to this annex shall not exceed 0.010

($\Delta t_m \leq 0.010$).

2.4. Resistance to mechanical deterioration

2.4.1. Mechanical deterioration method

The outer face of the three new samples (lenses) shall be subjected to the uniform mechanical deterioration test by the method described in appendix 3 to this annex.

2.4.2. Results

After this test, the variations:

in transmission: $\Delta t = \frac{T2 - T3}{T_2}$,

and in diffusion: $\Delta t = \frac{T5 - T4}{T_2}$,

shall be measured according to the procedure described in appendix 2 in the area specified in paragraph 2.2.4. above. The mean value of the three samples shall be such that: $\Delta t_m \leq 0.100$; $\Delta d_m \leq 0.500$.

2.5. Test of adherence of coatings, if any

2.5.1. Preparation of the sample

A surface of 20 mm x 20 mm in area of the coating of a lens shall be cut with a razor blade or a needle into a grid of squares approximately 2 mm x 2 mm. The pressure on the blade or needle shall be sufficient to cut at least the coating.

2.5.2. Description of the test

Use an adhesive tape with a force adhesion of 2 N/(cm of width) ± 20% measured under the standardized conditions specified in appendix 4 to this annex. This adhesive tape, which shall be at least 25 mm wide, shall be pressed for at least five minutes to the surface prepared as prescribed in paragraph 2.5.1.

Then the end of the adhesive tape shall be loaded in such a way that the force of adhesion to the surface considered is balanced by a force perpendicular to that surface. At this stage, the tape shall be torn off at a constant speed of 1.5 m/s ± 0.2 m/s.

2.5.3. Results

There shall be no appreciable impairment of the gridded area. Impairments at the intersections between squares or at the edges of the cuts shall be permitted, provided that the impaired area does not exceed 15% of the gridded surface.

2.6. Tests of the complete headlamp incorporating a lens of plastic material

2.6.1. Resistance to mechanical deterioration of the lens surface

2.6.1.1. Tests

The lens of lamp sample No. 1 shall be subjected to the test described in paragraph 2.4.1. above.

2.6.1.2. Results

After the test, the results of photometric measurements carried out on the headlamp in accordance with this Regulation shall not exceed by more than 30% the maximum values prescribed at points B 50 L and HV and not be more than 10% below the minimum values prescribed at point 75 R (in the case of headlamps intended for left-hand traffic, the points to be considered are B 50 R, HV and 75 L), in the case of front fog lamps this requirement shall be applied to zones A and B only.

2.6.2. Test of adherence of coatings, if any

The lens of lamp sample No. 2 shall be subjected to the test described in paragraph 2.5. above.

3. VERIFICATION OF THE CONFORMITY OF PRODUCTION

3.1. With regard to the materials used for the manufacture of lenses, the lamps of a series shall be recognized as complying with this Regulation if:

3.1.1. After the test for resistance to chemical agents and the test for resistance to detergents and hydrocarbons, the outer face of the samples exhibits no cracks, chipping or deformation visible to the naked eye (see paras. 2.2.2., 2.3.1. and 2.3.2.);

3.1.2. After the test described in paragraph 2.6.1.1., the photometric values at the points of measurement considered in paragraph 2.6.1.2. are within the limits prescribed for conformity of production by this Regulation.

3.2. If the test results fail to satisfy the requirements, the tests shall be repeated on another sample of headlamps selected at random.

Annex 6 - Appendix 1

CHRONOLOGICAL ORDER OF APPROVAL TESTS

A. Tests on plastic materials (lenses or samples of material supplied pursuant to paragraph 2.2.4 (Regulations Nos. 1, 8, 19, 20; paragraph 3.2.4 in Regulations Nos. 5, 31, 57, 72) of this Regulation)

Tests	Samples	Lenses or samples of material						Lenses						
		1	2	3	4	5	6	7	8	9	10	11	12	13
1.1	Limited photometry (para. 2.1.2)										X	X	X	
1.1.1	Temperature change (para. 2.1.1)										X	X	X	
1.2	Limited photometry (para. 2.1.2)										X	X	X	
1.2.1	Transmission measurement	X	X	X	X	X	X	X	X	X				
1.2.2	Diffusion measurement	X	X	X				X	X	X				
1.3	Atmospheric agents (para. 2.2.1)	X	X	X										
1.3.1	Transmission measurement	X	X	X										
1.4	Chemicals agents (para. 2.2.2)	X	X	X										
1.4.1	Diffusion measurement	X	X	X										
1.5	Detergents (para. 2.3.1)				X	X	X							
1.6	Hydrocarbons (para. 2.3.2)				X	X	X							
1.6.1	Transmission measurement				X	X	X							
1.7	Deterioration (para. 2.4.1)							X	X	X				
1.7.1	Transmission measurement							X	X	X				
1.7.2	Diffusion measurement							X	X	X				
1.8	Adherence (para. 2.5)													X

B. Tests on complete headlamps (supplied pursuant to paragraph 2.2.3 (Regulations Nos. 1, 8, 19, 20; paragraph 3.2.3 in Regulations Nos. 5, 31, 57, 72) of this Regulation)

Tests	Complete headlamp	
	Sample No.	
	1	2
2.1. Deterioration (para. 2.6.1.1)	X	
2.2. Photometry (para. 2.6.1.2)	X	
2.3. Adherence (para. 2.6.2)		X

Annex 6 - Appendix 2

METHOD OF MEASUREMENT OF THE DIFFUSION AND TRANSMISSION OF LIGHT

1. EQUIPMENT (see figure)

The beam of a collimator K with a half divergence $\frac{\beta}{2} = 17.4 \times 10^{-4}$ rd is limited by a diaphragm D_1 with an opening of [illegible] mm against which the sample stand is placed.

A convergent achromatic lens L_2, corrected for spherical aberrations, links the diaphragm D_1 with the receiver R; the diameter of the lens L_2 shall be such that it does not diaphragm the light diffused by the sample in a cone with a half top angle of $\beta/2 = 14°$.

An annular diaphragm D_2 with angles $\frac{\alpha_0}{2} = 1°$ and $\frac{\alpha_{max}}{2} = 12°$ is placed in an image focal plane of the lens L_2.

The non-transparent central part of the diaphragm is necessary in order to eliminate the light arriving directly from the light source. It shall be possible to remove the central part of the diaphragm from the light beam in such a manner that it returns exactly to its original position.

The distance L_2 D_1 and the focal length F_2 1/ of the lens L_2 shall be so chosen that the image of D_1 completely covers the receiver R.

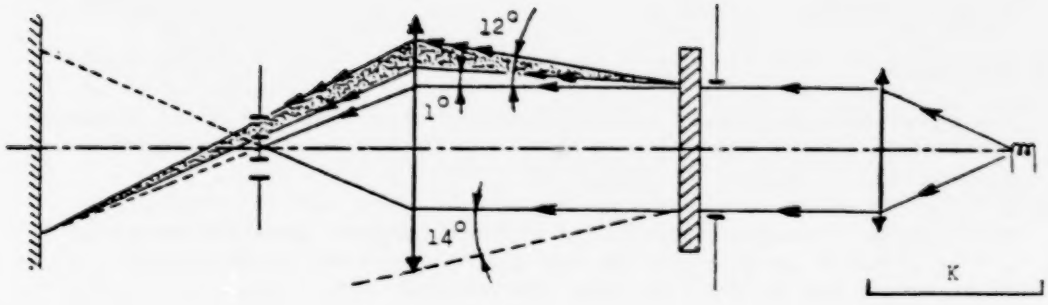
When the initial incident flux is referred to 1,000 units, the absolute precision of each reading shall be better than 1 unit.

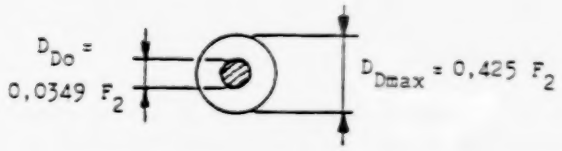
2. MEASUREMENTS

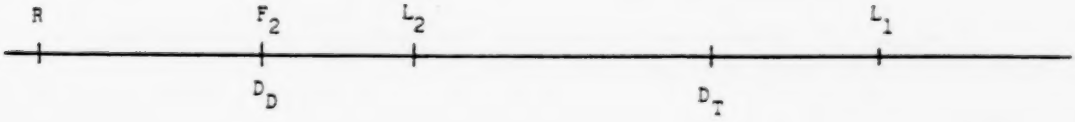
The following readings shall be taken:

Reading	With sample	With central part of D_2	Quantity represented
T_1	no	no	Incident flux in initial reading
T_2	yes (before test)	no	Flux transmitted by the new material in a field of 24° C
T_3	yes (after test)	no	Flux transmitted by the tested material in a field of 24° C
T_4	yes (before test)	yes	Flux diffused by the new material
T_5	yes (after test)	yes	Flux diffused by the tested material

1/ For L_2 it is recommended to use a focal distance of about 80 mm.


12°
1°
14°
K


D_{Do} =
0,0349 F_2
D_{Dmax} = 0,425 F_2


R
F_2
L_2
L_1
D_D
D_T

Annex 6 - Appendix 3

SPRAY TESTING METHOD

1. Test equipment

1.1. Spray gun

The spray gun used shall be equipped with a nozzle 1.3 mm in diameter allowing a liquid flow rate of 0.24 ± 0.02 l/minute at an operating pressure of 6.0 bars - 0, + 0.5 bar.

Under these operation conditions the fan pattern obtained shall be 170 mm ± 50 mm in diameter on the surface exposed to deterioration, at a distance of 380 mm ± 10 mm from the nozzle.

1.2. Test mixture

The test mixture shall be composed of:

Silica sand of hardness 7 on the Mohr scale, with a grain size between 0 and 0.2 mm and an almost normal distribution, with an angular factor of 1.8 to 2;

Water of hardness not exceeding 205 g/m^3 for a mixture comprising 25 g of sand per litre of water.

2. Test

The outer surface of the lamp lenses shall be subjected once or more than once to the action of the sand jet produced as described above. The jet shall be sprayed almost perpendicular to the surface to be tested.

The deterioration shall be checked by means of one or more samples of glass placed as a reference near the lenses to be tested. The mixture shall be sprayed until the variation in the diffusion of light on the sample or samples measured by the method described in appendix 2, is such that:

$$\Delta d = \frac{T5 - T4}{T_2} = 0.0250 \pm 0.0025$$

Several reference samples may be used to check that the whole surface to be tested has deteriorated homogeneously.

Annex 6 - Appendix 4

ADHESIVE TAPE ADHERENCE TEST

1. PURPOSE

This method allows to determine under standard conditions the linear force of adhesion of an adhesive tape to a glass plate.

2. PRINCIPLE

Measurement of the force necessary to unstick an adhesive tape from a glass plate at an angle of 90°.

3. SPECIFIED ATMOSPHERIC CONDITIONS

The ambient conditions shall be at 23° C ± 5° C and 65 ± 15% relative humidity (RH).

4. TEST PIECES

Before the test, the sample roll of adhesive tape shall be conditioned for 24 hours in the specified atmosphere (see para. 3 above).

Five test pieces each 400 mm long shall be tested from each roll. These test pieces shall be taken from the roll after the first three turns were discarded.

5. PROCEDURE

The test shall be under the ambient conditions specified in paragraph 3.

Take the five test pieces while unrolling the tape radially at a speed of approximately 300 mm/s, then apply them within 15 seconds in the following manner:

Apply the tape to the glass plate progressively with a slight lengthwise rubbing movement of the finger, without excessive pressure, in such a manner as to leave no air bubble between the tape and the glass plate.

Leave the assembly in the specified atmospheric conditions for 10 minutes.

Unstick about 25 mm of the test piece from the plate in a plane perpendicular to the axis of the test piece.

Fix the plate and fold back the free end of the tape at 90°. Apply force in such a manner that the separation line between the tape and the plate is perpendicular to this force and perpendicular to the plate.

Pull to unstick at a speed of 300 mm/s ± 30 mm/s and record the force required.

6. RESULTS

The five values obtained shall be arranged in order and the median value taken as the result of the measurement. This value shall be expressed in Newtons per centimetre of width of the tape.

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